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## PATENT SPECIFICATION



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359,570

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(Divided out of No. 352,639.)

Complete Accepted : Oct. 19, 1931.

### COMPLETE SPECIFICATION.

#### Improvements in the Manufacture of Bearing Metals.

We, HIRSCH, KUPFER- UND MESSINGWERKE, A.G., a company organised under German Law, of Messingwerk, near Eberswalde, Germany, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to the manufacture of bearing metals, for which latter there have hitherto been almost entirely employed alloys of metals whose structures correspond to quite definite prescriptions. It is required of such an alloy that it should consist of crystalline bodies of different hardnesses. There should be embedded in a soft ground mass harder crystalline bodies that chiefly support the shaft. Such an arrangement of the structure has the advantage that on failure of the lubrication, a stoppage of the shaft does not occur as readily as in the case of homogeneous metals.

The most important representative of such bearing metals is copper-tin bronze with a tin content of up to about 25%. In such alloys there has been found in the structure a mixture of hard  $\delta$  crystals embedded in soft  $\alpha$  mixed crystals. In the case of the so-called white metals, which consist of copper-antimony-tin alloys, hard crystals are formed by a combination of antimony-tin and antimony-copper. These are embedded in the eutectic which is rich in tin. Both alloys are very expensive on account of their high tin content, so that it has been attempted to replace the tin by cheaper metals, but the alloys obtained in this way have only a low strength and are consequently not equal to great strains.

According to the present invention, a bearing metal consists of a copper-silicon-zinc alloy with a copper content which is substantially above that of the special brasses, i.e. a content of 65—80% of copper and 2—6% of silicon. Advantageously, there are employed such alloys with a silicon content which is necessary for the formation of a crystal having a high silicon content. This crystal possesses,

in comparison with the other structures, especially high degree of hardness and is found to be distributed in a manner similar to the  $\delta$  crystals in the copper-tin alloys. In order to obtain such an alloy, 2—3% of silicon in the case of about 65—75% of copper and about 3—4% of silicon in the case of more copper. The formation of a structure which is specially

suitable for employment as a bearing metal is favoured by a small addition of tin within the limits of 0.1%—3%. Thus, for example, a particularly suitable alloy has a composition of 76% copper, 20% zinc, 3% silicon and 1% tin.

In the specification to our Patent No. 352,639 there is described a similar copper-silicon-zinc alloy which is employed in the manufacture of castings of high tensile strength, and in connection with the manufacture of sheets, rods, wires, tubes etc. by hot rolling or squinting, a brass alloy of 63—80% copper, 20—37% spelter having mixed with each hundred pounds thereof  $\frac{1}{4}$ —4% silicon has also been proposed.

The present invention, however, consists of a bearing metal of the specified alloy having a silicon content of 2 to 6% since in copper-zinc alloys with a copper content which is substantially above that of the special brasses, the silicon content that is possible can be considerably larger.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A bearing metal consisting of a copper-silicon-zinc alloy with a content of 65—80% of copper and 2—6% of silicon.

2. A bearing metal according to claim 1, characterised in that the alloy contains a small proportion of tin within the limits of 0.1 and 3%.

3. A bearing metal according to claim 1 or 2, characterised in that it consists of an alloy of 76% copper, 20% zinc, 3% silicon and 1% tin.

Dated this 22nd day of April, 1931.

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Reference has been directed, in pursu-  
ance of Section 7, Sub-section 4, of the  
Patents and Designs Acts, 1907 to 1928,  
to Specification No. 350,889.

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